



**Worksheet #9**  
**Assessing the Risk of Groundwater Contamination from**  
**Silage Storage**

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**Why should I be concerned?**

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Silage is an essential feed for livestock-based agriculture. When properly harvested and stored, silage poses little or no pollution threat, but improper handling can lead to a significant flow of silage juices (or leachate) from the silo. Leachate is an organic liquid that results from pressure in the silo or from extra water entering the silo. It is usually a problem only when silage is fresh, or just after storage. This loss of leachate represents a major loss of nutrient value from the silage.

Silage liquid is often highly acidic and can be corrosive to concrete and steel. If it enters a stream, its high organic content feeds bacteria that rob the water of oxygen. Groundwater contaminated with silage juices has a disagreeable odor and shows increased levels of acidity, ammonia, nitrates, and iron.

Along with the pollutants found in silage leachate, an even greater potential threat is that the low pH created by the presence of acids in silage leachate can free up and release naturally occurring metals in the soil and aquifer, which can increase their concentrations in groundwater. Leachate from 300 tons of high-moisture silage has been compared to the sewage generated daily by a city of 80,000 people.

Nitrate is the most important potential contaminant to consider. Levels of 20-40 milligrams per liter (mg/l; equivalent to parts per million in water measure) can cause livestock problems, especially if feed contains more than 1,000 ppm nitrate-nitrogen. Water with levels over 100 mg/l nitrate-nitrogen should not be used for livestock. Water with over 10 mg/l nitrate-nitrogen should not be used for infants under 6 months of age.

**The goal of Farm\*A\*Syst is to help you protect the groundwater that supplies your drinking water.**

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**How will this worksheet help me protect my drinking water?**

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- It will take you step by step through your silage storage practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
- It will provide you with easy-to-understand rankings that will help you analyze the risk level of your silage storage practices.
- It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

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**How do I complete the worksheet?**

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Follow the directions at the top of the chart on the next page. It should take you about 10 minutes to complete this worksheet and figure out your ranking.

# Worksheet #9

## Silage Storage: Assessing Drinking Water Contamination Risk

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that best describes conditions on your farmstead. (Skip and leave blank any categories that don't apply to your farmstead)
3. Then look above the description you circled to find your rank number (4, 3, 2, or 1) and enter that number in the blank under *your rank*.
4. Directions on overall scoring appear at the end of the worksheet.

	<b>LOW RISK</b> (rank 4)	<b>LOW-MOD RISK</b> (rank 3)	<b>MOD-HIGH RISK</b> (rank 2)	<b>HIGH RISK</b> (rank 1)	<b>YOUR RANK</b>
<b>Silage moisture content</b>	Below 65%	Between 65% and 70%	Between 71% and 85%	Over 85%	
<b>Silage storage location</b>	At least 100 feet down-slope from well (silos, glass-lined feed storage, plastic tubes). At least 500 feet down-slope (earthen trench). Water drains away from storage to field or pasture.	At least 50 feet down-slope from well (silos, glass-lined feed storage, plastic tubes). At least 250 feet downslope (earthen trench). Water drains away from storage to field or pasture.	Within 100 feet upslope of well (silos, glass-lined feed storage, plastic tubes). Within 500 feet upslope (earthen trench). Water pools or stands near storage.	Within 50 feet of well (silos, glass-lined feed storage, plastic tubes). Within 250 feet (earthen trench). Water pools or stands near storage.	
<b>Silage storage floor or surface condition</b>	Concrete or asphalt surface. No cracks.	Concrete or asphalt surface. Some cracks.	Surface has some permeable soils (silt loam) and has some cracks.	Surface has permeable soils (sand), not compacted.	
<b>Silage storage cover condition</b>	Cover tight fitting. No leaks.	Cover tight fitting. Minor leaks repaired.	Cover, but many large leaks not repaired.	No cover.	
<b>Silage storage lining</b>	New, very good condition	6 to 25 years old. Leaks repaired	Rust spots. No leakage visible.	Rust spots. Cracks. Leaks visible.	
<b>Leachate collection system</b>	Designed system in place and maintained or not needed.	Designed system in place but not maintained.	No system in place. Leachate moves to waterway.	No system in place. Leachate collects in low area.	

TOTAL \_\_\_\_\_

## What do I do with these rankings?

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**Step 1:** Begin by determining your overall silage storage risk ranking. Total the rankings for the categories you completed and divide by the number of categories you ranked:

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_____ divided by _____ equals _____*		
total of rankings	# of categories Ranked	Risk ranking

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\*Carry your answer out

to one decimal place

**3.6-4=low risk 2.6-3.5=low to moderate risk 1.6-2.5=moderate to high risk 1-1.5=high risk**

This ranking gives you an idea of how your silage storage practices as a whole might be affecting your drinking water. This ranking should serve only as a very general guide, not a precise diagnosis. Because it represents an averaging of many individual rankings, it can mask any individual rankings (such as 1's or 2's) that should be of concern. (See Step 2.)

Enter your silage storage risk ranking on page 1 of Worksheet #12. Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you identify your farmstead's site conditions (soil type, soil depth and bedrock characteristics) and Worksheet #12 will show you how these site conditions affect your risk rankings.

**Step 2:** Look over your rankings for individual activities:

- Low-risk practices (4's): ideal; should be your goal despite cost and effort
- Low-to-moderate-risk practices (3's): provide reasonable groundwater protection
- Moderate-to-high-risk practices (2's): inadequate protection in many circumstances
- High-risk practices (1's): inadequate; pose a high risk of polluting groundwater

**Regardless of your overall risk ranking, any individual rankings of 1 require immediate attention. Some concerns you can take care of right away; others could be major - or costly projects, requiring planning and prioritizing before you take action.**

Find any activities that you identified as 1's and list them under *High-Risk Activities* on pages 6-7 of Worksheet #12.

**Step 3:** Read Fact Sheet #9, *Improving Silage Storage*, and consider how you might modify your farmstead practices to better protect your drinking water.

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